

# Spotlight on Automotive

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# Introduction: Changing gear in the fast-lane

**This is an era of unprecedented change in the automotive sector. Not since the advent of the automobile has the future been so uncertain and the opportunities so immense.**

The car changed the world. It transformed both the environment and human society. It set off a wave of technological innovation that, it could be argued, was the engine of global economics for the entire span of the last century.

And it's all about to get even more exciting, or dangerous depending on your point of view. In this Spotlight, we asked Fujitsu experts, Hugo Lérias and Christof Schleidt, to think about the key issues and technologies that will affect automotive manufacturers in both the short and long-terms. There are complex issues to think about: the automobile brings together two

vital sectors – transport and manufacturing – and digital is transforming both of them.

Are cars fast becoming obsolete? What is 21st century mobility actually about? Are people falling out of love with cars and the effects they have on cities, people, and nature? Is a car a car anymore? Or is a node in a data network of digital communications and emergent lifestyles?

Nothing is certain. Everything is changing. You need to keep pace with disruptors and well as existing competitors that are making the most of the digital ecosystems and platforms which are transforming

society. And then there's data: so much data! Cars are being fueled by it, while at the same time producing immense amounts of it. Perhaps data really is the new oil, so how can you refine it into value?

We hope you enjoy the opinions and insights these articles contain. Let us know what you think. And let's drive the sector into a new and profitable future – together.

# Disruption is not a problem: it's an opportunity



**Christof Schleidt,**  
Director of Business  
Development and  
Digital Transformation



## Cars changed the world. Now the world is changing cars.

The invention of the automobile in the late 19th century is, perhaps, one of the most profound changes human society has ever seen. Cars, trucks, buses and a host of other vehicles are taken for granted by most of us. We spend a lot of time in our cars (or so it seems). We spend a good proportion of our income on cars (paying for the car itself, fuel, servicing, taxes, tolls etc.). And we invest much of our self-esteem in the car we own. Cars started out as status symbols – only the rich could afford them until Henry Ford created the Model T – and remain status symbols for quite a few drivers.

But the world is changing. And the automotive industry knows it. It is already starting to act positively to get ahead of disruption. The industry was born out of technological disruption – think where all the horse's society depended on ended up – and it continued to cause immense waves of disruption across many sectors from manufacturing to retail to logistics and, of course, all forms of transport.

Cars changed village, towns and cities. Cars even ushered in new ways of living from the daily commute to, some historians argue, changes in moral codes. When cars became a mass product they enabled young people to get away from their parents and, well, do what young people do when they're away from their parents!

## What drives history: people or technology?

Historians argue about what drives history: people or technology. For the last century or so you could argue that technology was at the wheel. The automotive industry designed new models, developed new technologies to improve safety, performance, and comfort, and consumers responded to them either positively or negatively.

Networks of dealers acted as middlemen in terms of both sales and after service. A new model was launched, it was advertised, and consumers made their choices.

That's all changing. And it's changing fast. History is happening in the fast lane. Visionary automotive manufacturers are already ahead of the game. They understand that we're entering a new era of history: people are now driving change. That's partly due to the historical success of the automotive industry: the fabric of our lives, from where we live to where we work, has been dictated by the ubiquity of the car and the roads needed to support it. That's had a big affect on the environment, and it's also become central to the health of many a national economy.

## The decline of car ownership?

Fewer consumers want to own a car. They are put off by the financial burden they represent, and the time they spend not moving very fast in traffic jams or congested cities which are increasingly trying to coax them onto public transport. Consumers now think about mobility as a mix of options. It's not just about driving from A to B, it's about the best way to get from A to B at the best price and with the most comfort.

You could argue that the coming of the smartphone and other sleek handheld computing devices has had a lot to do with that change. For the first time in our industrial society we all have a device that can offer us a range of options based on real-time data (traffic, public transport modes, taxis, ride and car sharing choices). And they also encourage us to do work, watch entertainment, communicate with friends and family, on a constant basis. That means an hour spent behind a wheel paying attention to the road is an hour lost to work, entertainment or sociability.



More and more of us don't like the experience of driving. We want that time to be more productive or enjoyable. That's why we've seen a rise in car sharing as well as the explosion of Uber and its rivals. The appearance of options such as DriveNow and Car-2-Go and MyTaxi and ZipCar prove the point. They look like disruptors which the established automotive sector should be afraid of. But, in truth, most of the brands are linked to automotive giants. They either created them or are working with them.

### **Disruption or opportunity?**

That's exciting. It shows an industry that's embracing disruption and turning it into an opportunity. It proves that those businesses are listening to what consumers are saying and watching what they're doing in practice. In a revealing interview with The Times in the UK, the general manager of ZipCar in Britain declared that his company was itself being disrupted; "No one is a disruptor for long," he said.

He added, "It's important not just to keep your head down thinking about what's going on in the business. Competition now comes from new entrants, not from your narrow competitive set: you need to cultivate a strong external focus so you can spot it."

KPMG's 2018 Global CEO Outlook discovered that the message is getting through at board-level; 95% saw disruption as an opportunity rather than a threat. But, revealingly, around 25% of them worried that their businesses were being slow to meet their customers' expectations for a personalized service. And, I would argue, that expectation in the automotive sector is just as important as it is in retail.

The modern driver – and most of us will still be drivers despite predictions that Millennials are choosing not to learn how to drive – wants a better experience. They might not own a car, but they will need one at certain times during their week or their month.

They don't want the hassle of owning a car, but they want its utility – the ability to get to A to B. And when they're in the car they want entertainment or the ability to do some work or just chat.

Delivering that experience demands a totally new approach to the automotive supply chain. The industry is no longer about raw materials, parts, and production lines, it's much broader than that. It's about creating an ecosystem that extends from raw materials to the consumer's lifestyle choices and back again. It's about creating a platform which the consumer can rely on to deliver what's been called 'mobility-as-a-service.' To build that platform automotive manufacturers have to make the right alliances. They can create their own products – like DriveNow – or get together with companies that used to be seen as disruptors. VW is partnering ZipCar's effort to bring more electric cars into the major metropolitan areas of Europe.



### Coping with Big Data

An ecosystem enables automotive businesses to leverage the power of data. Big Data is the key to delivering seamless mobility as well as sustainability and safety. To do that you need a platform – and a big one. When it comes to platforms, size definitely matters. Again, that's why big automotive players are making alliances with disruptors, established data players, as well as start-ups.

The end game is to ensure that the consumer, when they decide they want to drive their own car, or book a shared car, or order a ride from a taxi brand, can choose the experience that suits their needs or moods. Are they in work mode or social mode? Are they eager to self-drive or be driven? Are they time constrained, or just want to get somewhere interesting for the sake of being there?

Understanding the consumer's needs and expectations will transform the way cars are designed and made fundamentally. The age of the mass-produced model which rolls off the production line in its millions – all basically identical (with variations in fixed options and add-ons) – is over. Now, digital technology inside and outside the factory means that the mythical Lot Size 1 can be achieved. Each of those cars can be uniquely tailored to the end-user. An ordinary consumer can match their lifestyle needs to the functions of the car: they can have more or less, all or none.

And, of course, the consumer might not be the customer. The automotive brand might be its own customer via its car-sharing or ride hailing apps. That means they have to act like fleet operators as well as car sales people. It also means that the entire supply chain will have to be rethought and re-organized. It already is.

### Staying ahead of consumer expectations

Right from the start, the car industry was about individual choice. At the beginning it was the simple, but unique, ability to drive yourself somewhere when you wanted and taking the route you wanted. That was the lure of the first automobiles. It was about individual freedom. And individual freedom is still the point, but now it's more multi-faceted. It's about maximizing the utility of time whilst travelling and making it a more human, productive, and social experience.

That's the real disruption. And it's up to established automotive players to lead that disruption so they can stay ahead of consumer expectations and create a new, more seamlessly mobile and human future for all of us. It's an exciting time to be in the sector and Fujitsu is eager to help co-create it. Now.

# Beyond the 'connected car'



**Hugo Lérias,**  
Director, Industry Sectors,  
Business Application Service EMEIA

## How Over The Air updates will transform automotive business models

The idea of the 'connected car' is already an old idea. The automotive sector is moving so fast that ideas which once seemed futuristic are now commonplace. Drivers are used to software updates to their Sat Nav or entertainment systems. They take them for granted. They are an essential part of most models. Consumers expect them. But what they don't expect is the fact that, increasingly, the mission critical mechanical elements of their vehicle are also becoming more and more connected.

And that's the real opportunity. There are two layers to any car: the colorful, stylish, interactive layer which delivers the consumer experience – comfort, elegance, connectivity, entertainment and so on. Then, below it, is what I call the 'grey world' – the mechanical core of the vehicle – brakes, gears, engine components, fuel lines, the list is almost endless.

Most of us think of the 'connected' element in terms of the colorful, experiential element. But, increasingly, connectivity is going much deeper into that grey world to become a key element in the mission critical components of the modern car.

### So what? Is it really necessary to go so deep?

It is. It's a great opportunity to achieve three very important things: deliver a better, ongoing experience to customers; ensure safety and compliance with evolving environmental regulations; and mitigate the downsides of any product recall. It's a completely new business model that can deepen brand loyalty as well as save huge potential costs.

It's not a complicated idea, either. We all regularly (and maybe patiently) wait for our PCs and phones to update when prompted. Often, we don't even have a choice. The update is a fait accompli. What's being updated isn't just the software you interact with so effortlessly the firmware is also being updated. The machine is being told to go faster (or slower in some cases); the hard-drive might be re-configured to free up space, and the security systems are being strengthened to deal with new threats. You don't see any of that happening. Unless you dig into the guts of the machine you won't even know what's been changed. But, hopefully, when you switch on again the machine runs smoother, you have more RAM, and you can work more securely.

Most of us don't really care what's been updated, so long as the machine works and our data is still available. Over The Air updates to the mechanical parts of a vehicle achieve the same outcome. The car is suddenly more up to date! You haven't had to take it into a garage or interact with a dealer to make an appointment. It's just done over the air – either in the background, or at a time when you can leave the vehicle to go through the update process.

It sounds easy, but it takes a lot of technical thought and clever technology which can only be provided by an IT specialist. And that's why more and more automotive companies are partnering with IT specialists. The rapid rise of connectivity in vehicles demands an ecosystem of partners that can enable seamless updates and/or upgrades, as well as the ability to deal with a huge rise in the amount of data that's being generated on both sides of the relationship: the manufacturer and the consumer and they use the car.



### OTA will change relationships

The manufacturer will be able to bypass the dealerships or garages for many functions. The consumer (driver) will have a closer relationship with the manufacturer. And regulators will be able to address environmental standards or safety measures more directly on both sides of the equation.

So, if the regulator says that emission levels must fall, then the manufacturer can send out an update to specific components in the grey world so that they are compliant. The driver knows an update has occurred – and why. They allow it to take place. After a few minutes their car is completely compliant. They have not had to spend time making an appointment and then travel to the garage to get the work done. It's just done wherever the car happens to be. That's good for the customer, the manufacturer and the environment.

The manufacturer can use OTA to enable a model to evolve whilst the consumer owns it. They can have an engine upgrade, or a new drive-mode, or a better fuel consumption method delivered to their vehicles over the air. The car is no longer a fixed entity – a static model. That ability means that customer satisfaction can only go up. Who doesn't want an enhanced model without the hassle of buying a new car?!

In the light of what has happened over the last few years in terms of product recalls, the benefits of OTA are clear. It means that (in theory at least) most issues can be fixed without spending millions (sometimes billions) on getting in touch with drivers, generating appointments with garages, and racking up bills for labor and parts. Most importantly, it mitigates the risk of extreme reputational damage which can undermine the power of any brand, no matter how upscale or popular. Sales can fall as headlines about huge fines spread the reputational damage far and wide. So, anything that reduces those risks is certainly welcome.

But OTA isn't just about reducing cost and mitigating risk; it's an opportunity, as I've already mentioned, to reframe the relationship between an OEM and its customers – the drivers. You can offer features that can be turned on or off. For instance, in an electric car you can pay for battery capacity and horsepower to suit your daily needs – for instance, urban driving and short distances – whilst having the option to upgrade both for long trips. When Hurricane Katrina was heading to coastal areas of the United States a few years ago, Tesla automatically upgraded the power capacity of their models to enable drivers to keep going for long enough to get away from danger before they needed to re-charge.

That's a good example of the brand looking out for the consumer. It also represents an array of choices that most traditional cars can't provide. And consumers love choice. So, you could offer a package that includes simple, white lights around the trim. But, for an extra fee, you can have colored lights to add excitement to your drive. It's something many consumers might want to pay for, not necessarily all



the time, but maybe at Halloween or Christmas. Who knows! The point is, it's an extra choice, extra revenue, and many satisfied customers.

And it's all done OTA. It's a new value stream. And it depends on the right IT and the ability to handle vast amounts of data. It's also about the possibility of managing many cars at once. For the OTA opportunity to be realized you need to achieve scalability. True value will only be achieved if you can do this at scale – across millions of vehicles.

### The development of autonomous cars is also relevant

Connectivity is vital in terms of both telematics and video data which can be collected from vehicles driven by real people so that it can influence those driven by computers. It's impossible for test fleets of 200 or so autonomous cars to experience any and every driving or road scenario. You need to flow real-world experience from human drivers into the algorithms so they learn faster and more comprehensively.

Again, that means thinking differently about what kind of business you are: you're no longer a manufacturer of individual vehicles, you are a fleet manager, a customer engagement specialist, a software/computer/connectivity company. You are also a security specialist – the possibility of fleets of cars being hacked by someone with bad intentions is a bad dream none of us want to be realized.

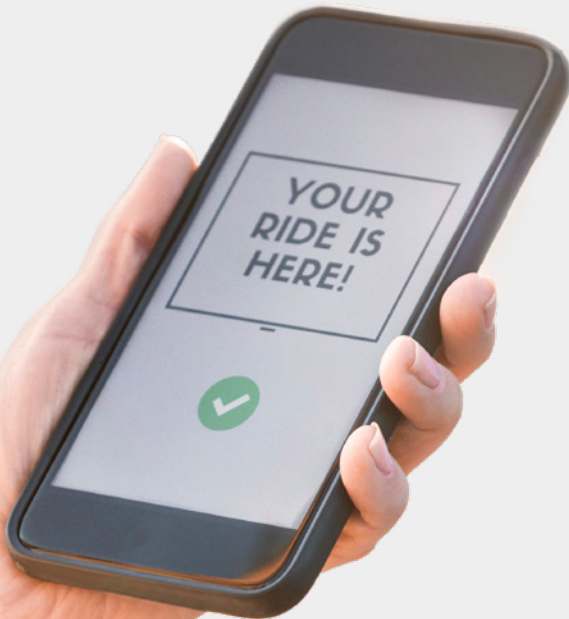
OTA helps you know your drivers better, stay in control of your models, enable them to evolve, and have the ability to stay in line with regulations as well as offset any problems which might lead to a recall. Most of all, it's an opportunity to forge new business models which deliver real value in a hyperconnected world.



# Redefining Mobility



**Q&A with  
Christof Schleidt,**  
Director of Business  
Development and  
Digital Transformation



## What does mobility mean in the data driven 21st century?

Mobility isn't physical or mechanical any more. It's all about data. Very Big Data. And, most importantly, it's about mobility based on real-time information. We all live time constrained lives. More and more of us work on the move. New ways of working mean that fewer and fewer people sit at desks all day in one office building. They interact with partners, colleagues and customers in all kinds of places, from cafes to factories to different modes of transport. That means we need to schedule our time carefully and ensure that whatever mode of transport we choose, it can support our needs (from Wi-Fi to power) and gets us to where we want to be on time, in comfort and safety, and for the right place.

The automotive sector is already responding to this transformation in mobility. The creation of new ways to share cars or hail rides in taxis or even other people's cars, is bringing a huge amount of flexibility to the mobility choices on offer, especially in major cities. But, the real challenge is how do you mesh all of the options together and provide a real-time view not just to the operators of these services but, most importantly, to the consumers of them?

## Real life needs data

For instance, what if you're in Munich for the day, and you have some business meetings, but also need to get home to the suburbs for a specific time; you have a family reunion to attend. The weather isn't good; it's raining, not heavily, but enough to make the roads busy. More people want taxis. The number of car-shares is up. DriveNow vehicles are getting booked quickly. Also, that evening, Bayern Munich are playing at the Allianz Arena. At around 5pm there will start to be a lot of traffic heading that way not just of Bayern fans, but the away team's supporters too.

Are the buses running OK? Are the trains free from delays? Should I take the metro? Maybe I can book a car, or splash out on a taxi? My goal is to get my work done during the day, arrive at my appointments on time, and then start to head out from the city so I can be sure to be on time for the family dinner.

Before the coming of the smartphone I'd have to use a lot of guesswork, perhaps make a call or too, and just hope that the choice I make is the right one. Now, of course, we can use all kinds of apps to check timetables, service status, traffic reports, and weather conditions. The future though will be all about bringing all that data together in real-time to give me an instant picture of my trip from A to B and provide me with the right choice based on my individual preferences.

Get me home by 7pm. Get me around the traffic caused by the football match. Ensure I have time to do my emails before I get home. I'm willing to pay a little extra tonight because I'm tired and I have an appointment I can't miss. The algorithms work together to give me the right choice based on the data that's being gathered by thousands of sensors and vehicles.

## Defining 21st century mobility

THAT is the definition of 21st century mobility. And it is changing the way automotive manufacturers think of their business. It's not just about making individual cars, it's about delivering mobility via fleets of cars which have to be managed in real-time. Mobility is, after all, about time: the time it takes to get from A to B and back again. The complexity of ensuring that the right number of cars are in the right place if you are offering car-sharing services. The consumer must be able to find a car that's close to them, and then be confident that they can park it at their destination and, perhaps, then complete their return or onward journey via another mode of transport – a bike or a bus or a train or even a taxi with a driver.



Achieving that seamless mobility is a huge data challenge. It takes a complex, robust, and ever evolving platform that encompasses all kinds of providers and options. The automotive business is no longer just about individual brands, it's about alliances across many brands and sectors – private and public. Again, it's about sharing data between all those players so the consumer just gets to where they want to be when they want to be there.

The automotive manufacturer does not have to build their own mobility app if they don't want to, just as mobility providers like Uber or Waymo are not looking to go into the business of making cars by building factories. The point is to ensure that the right people and technologies are aligned to deliver the platform that the customer uses. That also means understanding how fleets are managed so that the automotive brand can get close (and stay close) to the ultimate consumer. If the brands don't do it, then the dealers will.

### **It's about relationships**

The real value in 21st century mobility resides in the relationship with the customer across different modes of transport, not just within individual cars. The fall in rates of individual car ownership mean that manufacturers need to re-think that model range. They will sell fewer cars and at lower margins, but they will then yield more value through the ongoing relationship with the consumer – who sometimes is a driver, sometimes a passenger, but always on the move.

Sure, you will still sell your brand based on emotion and features as well as status (in some cases), but those things would be solely embedded in the mechanical vehicle itself. It will reside on the platform. It is about consumer outcomes. The network effects that a platform can deliver will, ultimately, be the key to success. Just as Uber grew rapidly because they recruited what looked like too many drivers, but that meant users got rides quicker and cheaper, which meant they told their friends. Uber's growth was amazing.

It's a great vision, but it is a dangerous one too. If the front end – the app, the day-to-day, hour-by-hour service, doesn't match up to the promise, then the app can be deleted in seconds and another loaded just as quickly. Managing data then becomes the key to a successful mobility business. That takes the right alliances: between cloud providers and coders and algorithm, AI and machine learning specialist as well as safety and security experts.

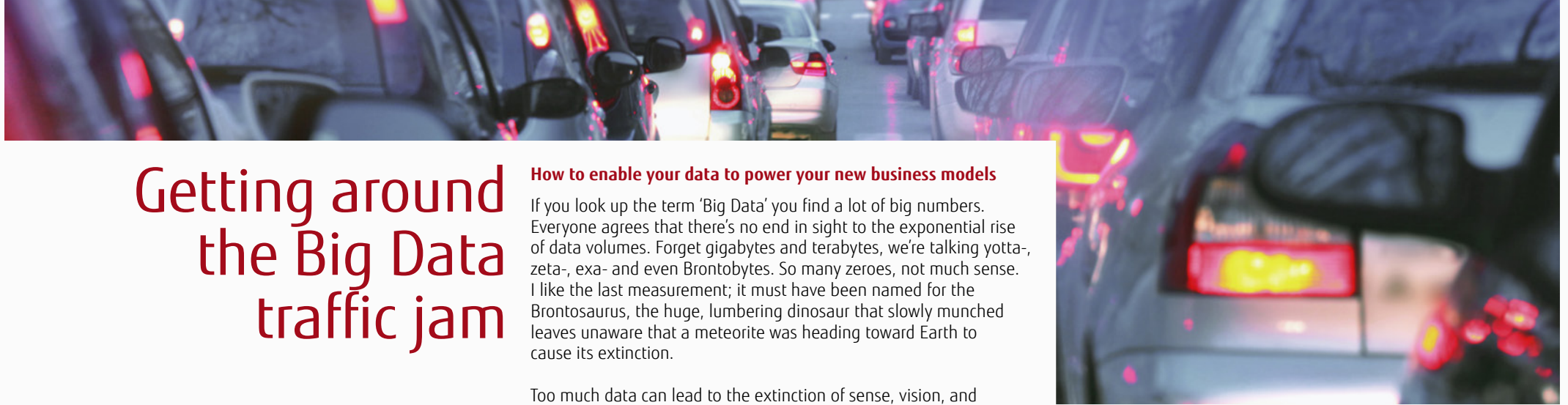
### **An exciting future for mobility**

At Fujitsu, we're convinced that the future of mobility is very exciting. But only if it's approached the right way around: it's not about vehicles it's about data. Data and vehicles and all kinds of transport types. They have to be seamlessly connected and intelligently managed. That means people and machines being intelligent together. AI and machine learning are key to solving the real-time transport conundrum.

And when autonomous cars start to become mainstream the data problem will grow exponentially. But, hopefully, by then we'll have created an evolving ecosystem which can both cope with and enable the rise of new services and demands from consumers. We need to work together to achieve seamless mobility now as well as be ready for the inevitable rise of autonomous vehicles of all kinds. That's why Fujitsu's Digital Annealer is so important. It's bringing the power of Quantum Computing to the mobility sector faster and more effectively than was thought possible a few years ago.

Automotive manufacturers are engineers. They have an engineering outlook. That's no surprise and it's not a bad thing. But it needs to be transformed into a digital outlook based an Agile development approaches so that the constantly changing needs of cities, the environment, regulators, and consumers can be met faster and more creatively. Fujitsu is working with automotive customers too bridge the gap between the traditional engineering approach and new digital models. It's exciting and it's creative. Co-creation is key to success. And it's something we've been doing for decades in Japan.

Our job is to ensure that whatever choice your consumer makes, it's your car or your service that's first to offer the best choice. That's how you can thrive and grow in a world of digital mobility.



# Getting around the Big Data traffic jam



**Hugo Lérias,**  
Director, Industry Sectors,  
Business Application Service EMEA

## How to enable your data to power your new business models

If you look up the term 'Big Data' you find a lot of big numbers. Everyone agrees that there's no end in sight to the exponential rise of data volumes. Forget gigabytes and terabytes, we're talking yotta-, zeta-, exa- and even Brontobytes. So many zeroes, not much sense. I like the last measurement; it must have been named for the Brontosaurus, the huge, lumbering dinosaur that slowly munched leaves unaware that a meteorite was heading toward Earth to cause its extinction.

Too much data can lead to the extinction of sense, vision, and decision making. Our brains aren't wired to take in a lot of data. They like a few, simple data points on which to base decisions. Which is why we have computers. They're supposed to crunch through the numbers and provide those data points. But, the problem is our computers haven't kept pace with the amount of data we're producing across industry, commerce, society and every other human endeavor.

That then means we can't extract the insights which the immense volume of data can (and should) yield. So, we take shortcuts. Google's Research Director and AI specialist, Peter Norvig said not so long ago that "Simple models and a lot of data trump more elaborate models based on less data." So, the point is to be able to use as much data as possible but to have a clear idea of what you are looking for, or what problem you want to solve.

In the automotive sector the problems are reasonably clear: there is an immense amount of data being generated by modern, highly sophisticated vehicles. Each vehicle has an increasingly number of video camera and sensors. It is more connected than ever before via telematics. It is also part of a range of wider systems: communications networks, transport infrastructures, Smart City systems, safety and security protocols – the list is very long.

The amount of data all of things represent is becoming to big for any automotive manufacturer to cope with on their own. That's why at Fujitsu, we're working hard to enable automotive customers to stay ahead of the Big Data storm surge. And the only way to do that is to be clever about how we capture, store, and analyze data, and how we deploy new ways to compute it.



### Let's start with video

It's inherently data rich. Good, high definition video eats bandwidth for breakfast, lunch and dinner. But HD delivers more clarity and information. It boosts security and safety, but is also enables machine learning algorithms to, well, learn more. That's vital as we make cars more autonomous and, eventually, achieve higher levels of autonomy.

For autonomous cars to achieve a more 'human' driving capability we need more and more data. That can't just come from test fleets which even if they number in the hundreds, can never replicate the totality of driving situations and experiences represented by billions of drivers, vehicles, roads, pedestrians and so on and so on. So, the best way to speed development is to aggregate the data captured from cameras in human driven cars. That's billions more terabytes of data. Or, a few Brontobytes more.

How do we make the most of that video data without overloading systems, networks, servers, and storage designed to cope with the relatively limited (though still mind-bendingly vast) needs of the manufacturing sector? We take a leaf out the one industry that has had to solve the problem: the movie and TV broadcast industries. They are managing to send Ultra High Definition, 4K (and soon 6K and 8K) video around the world at lower and lower cost with greater and greater accuracy and quality.

They do it through clever compression. And that's what we're offering our customers: the same kind of quality and speed as the Broadcast industry achieves to reach screens of all kinds every day. It's all based on knowing what's important and only collecting that instead of everything. So, our codecs (which compress the data using standards H.264 and H.265 for the technically minded) work hard to reduce data volumes with the help of algorithms which ensure that the right

data gets kept and sent into the Cloud so that it can analyzed and/or stored. It's all based on commonsense: if the vehicle is sitting in traffic there's no point continuing to collect high definition video. So, the quality and framerate are reduced saving space and bandwidth. When something new happens, the images are collected at their highest quality to ensure all the data is collected.

It really is that simple. The quality of the data is not compromised. And the ability to use that data to improve machine learning and to achieve insights is also improved. But, that still leaves the question of how we can continue to cope with the rising volumes of data. How can we make sure that we deliver value from data quickly in a fast-moving marketplace?



### The answer is to use Quantum Computing

Well, it's not quite the answer because Quantum Computing is still a, mostly, theoretical construct. They started as a thought experiment by the famous mathematician, Richard Feynman, who asked if it were possible to simulate physics on a computer. He wondered if the vast number of simultaneous processes that make up the universe could be replicated in bits of information.

The problem is that the numbers are too big for ordinary computers to cope with. The answer would be to build a computer that acted like the universe – that is, it had a quantum quality – it could run many calculations simultaneously to answer key questions or describe what was really happening in a system. The quest to do just that is still going on. Unfortunately, automotive manufacturers can't go out and buy a quantum computer right now. But, why not have some of that power available to gain insights from those Brontobytes of data now?

That's where our Digital Annealer comes in. Anneal is a good word for it: it means to heat and then cool something so that it becomes stronger, which is how something like steel is made. It also means to toughen something and make it more robust, which also happens within our genes. That describes what we're doing to all that raw data – we're running many calculations so that string patterns emerge. That's vital if you're managing a big system like a car sharing service. You can understand where your cars are, how they are being used, how customers are driving and parking them, when they're using them most or least, how that links to traffic conditions, events in the city, other modes of transport, weather conditions and so on. Understanding all of those simultaneous factors quickly can give you a competitive edge as well as manage costs and risk.

The point is to get real time insights from a large number of systems. You don't need a lot of computer hardware or the cooling and management systems they usually need. The Digital Annealer uses a digital circuit design that was inspired by quantum phenomena. It can solve problems which most ordinary computers can't even start to cope with. To use the technical jargon, it offers very highly accurate expressions of complex combinatorial optimization problems. And it's small, very stable, and works at normal room temperatures.

### It's working

We've been trialing the Digital Annealer with a leading automotive player and it's showing immense promise. Which is the point: data is driving the industry and it's important that too much data doesn't slow you down. It shouldn't clog your intellectual and innovative engines by slowing down decision making. Coping with rising video data as well as all other forms of data is key to ensuring you're making the right decisions in real-time as well as about the future direction of your business.

Don't get stuck in the data traffic jam, open the freeway to innovation.

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